Bear Run Mine Fugitive Dust Monitoring Plan

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1.0 INTRODUCTION

Peabody Midwest Mining, LLC (PMM) has retained McVehil-Monnett Associates, Inc,. (MMA) to develop a plan to conduct ambient monitoring for PM_{10} and meteorological variables over a multi-month period at the Bear Run Mine in Carlisle, Indiana. PM_{10} will be monitored on a one-hour integrated basis utilizing federal equivalent method (FEM) samplers at three (3) locations. See Table 1 for instrument listings and Appendix A for detailed instrument specifications. One downwind site will also have a federal reference method (FRM) sampler collocated with the FEM. Siting of the monitors has been determined based on established regulatory methodologies and will rely on relevant site specific information. The process for siting the monitors is discussed in detail in the following section.

PM_{10} sampling will be conducted in accord with all relevant requirements as described in Section 2.11 of the "Quality Assurance Handbook for Air Pollution Measurement Systems, Volume II: Ambient Air Specific Methods". Quality assurance/quality control procedures are addressed in Section 3.0, below and will be described in detail in a Quality Assurance Project Plan (QAPP) that meets the "Guidance for Quality Assurance Project Plans, EPA QA/G5", EPA/240/R-02/009, December 2002. The QAPP will be submitted by June 1, 2012.

The PM_{10} monitoring program will be further supported with the collection of on-site meteorological data. A 10-meter tower will be installed at one of the three PM_{10} sites where wind speed and wind direction will be measured at 10 meters and temperature and barometric pressure will be measured at 2 meters. Precipitation will be measured near ground level with a heated gauge. All meteorological measurements will be collected in accord with the "Quality Assurance Handbook for Air Pollution Measurement Systems, Volume IV: Meteorological Measurements, Version 2.0" and any specific procedures as provided in the manufacturers operations manuals. See Table 1 for meteorological sensors listings and Appendix A for instrument specifications.

PMM will initiate all monitoring on June 15, 2012 assuming timely approval of the QAPP. Said monitoring will continue for four (4) months commencing on June 15, 2012 and terminating on October 15, 2012. Data reports will be generated on a monthly basis and submitted to EPA on the schedule described in Section 5.0 below. The FEM and FRM samplers will continue to be operated beyond the October 15th termination date for the agreed upon four month monitoring period until such time as all data reports for the four (4) months of monitoring have been provided to EPA and PMM and EPA have convened a meeting/call (as soon as practicable after the receipt of such data) to discuss the monitoring results for the designated monitoring period.

2.0 Monitor Siting and Installation

PMM has selected two monitoring sites in predominantly “downwind” directions from active mining areas and one site “upwind” of the mine. Samplers will be located in “ambient air” in areas not presently part of PMM’s active mining operation. Consistent with accepted regulatory guidelines, the PM_{10} monitors will be sited at optimal locations based on readily available information on mine plans, wind roses, ambient air boundaries and proximity to nearby residences. PMM has utilized a 5-year wind rose from the National Weather Service’s (NWS) Lawrenceville, Illinois station located 25 miles southwest of Bear Run. This is the closest data set with the requisite quality and quantity of data and is representative of conditions expected at Bear Run. A five-year (2006 – 2010) wind rose is included along with four five-year seasonal wind roses in Appendix B. (A wind rose is a useful way of displaying wind data to show the distribution of wind speeds and directions.)

In locating sites, four criteria must be considered in the site selection process depending on the sampling objective and are as follows:

1. Impacts of known pollutant emission categories on air quality.
2. Population density relative to projected impact locations.
3. Impacts of known pollutant emission sources on air quality.
4. Representative area-wide air quality.

In selecting locations according to these criteria, it is desired *“to have detailed information on the location of emission sources, geographical variability of ambient pollutant concentrations, meteorological, conditions and population density. Therefore, selection of the number, locations and types of sampling stations is a complex process.”* (Quality Assurance Handbook for Air Pollution Measurement Systems, Volume II: Ambient Air Specific Methods). The variability of sources, meteorological condition, and demographic features require that the selection of the monitoring sites will be based upon uniquely site-specific information and on the experience of PMM’s air quality consultant, MMA.

According to EPA's reference above, "*The sampling site selection process involves considerations of the following factors:*

Economics - The amount of resources required for the entire data collection program, including site operators, instrumentation, installation, safety equipment, maintenance, data and sample retrieval, sample analysis, data analysis, quality assurance, data interpretation, and reporting.

Security – Experience has shown that in some cases, a particular site may not be appropriate for the establishment of an ambient air station simply due to problems with the security of the equipment in a certain area. If the problems cannot be remedied via the use of standard security measures such as lighting, fences, etc, then attempts should be made to locate the site as near to the identified sector as possible while maintaining adequate security.

Logistics – Logistics is the process of dealing with the procurement, maintenance and transportation of material and personnel for a monitoring operation. This process requires the full knowledge of all aspects of the data collection operation including:

Planning	*Staffing*
Reconnaissance	*Procurement of goods and services*
Training	*Communications*
Scheduling	*Inventory*
Safety	

Atmospheric considerations – Atmospheric considerations may include the spatial and temporal variability of the pollutants and its transport to the monitoring site. Effects of terrain, vegetation, and heat sources or sinks on the air trajectories can produce local anomalies of excessive pollutant concentrations. Meteorology must be considered in determining not only the geographical location of a monitoring site but also such factors

as height, direction, and extension of sampling probes. The following meteorological factors can greatly influence the dispersal of pollutants:

> *Wind speed affects the travel time from the pollutant source to the receptor and the dilution of polluted air in the downwind direction. The concentrations of air pollutants are inversely proportional to the wind speed.*
>
> *Wind direction influences the general movements of pollutants in the atmosphere. Review of available data can indicate mean wind direction in the vicinity of the major sources of emissions.*
>
> *Wind variability refers to the random motions in both horizontal and vertical velocity components of the wind. These random motions can be considered atmospheric turbulence, which is either mechanical (caused by structures and changes in terrain) or thermal (caused by heating and cooling of land masses or bodies of water). If the scale of turbulent motion is larger than the size of the pollutant plume, the turbulence will move the entire plume and cause looping and fanning; if smaller, it will cause the plume to diffuse and spread out.*

If the meteorological phenomena impact with some regularity, data may need to be interpreted in light of these atmospheric conditions.

As stated above, available wind roses will be used to determine mean wind direction in the vicinity of the mine operation.

While the Lawrenceville wind rose shows a significant component of southerly wind, PMM owns and controls property for over 1.5 miles due north of the active pit. The nearest residences north of the active pit area are several miles away, while neighboring residences are as close as 1100 feet to the east of the active pit. Based on a detailed site inspection, two downwind sites and one upwind site meeting the

above requisite criteria were located. These locations are shown in the Figure 1and described more fully below.

The southernmost site (#1) is located just off SH159 on an abandoned lot now owned by PMM. As referenced on the attached map, this proposed monitoring site is immediately adjacent to several homes, a number of which are occupied by residents who have registered past complaints regarding dust impacts during active mining operations. One such residence is approximately 100 feet north of the selected monitoring site. This site is 1300 feet southeast of the active pit and represents the closest practical location to those emission-causing activities. Both an FEM and an FRM will be located at this site.

The location selected for Site #2 is roughly 2500 feet northeast of the active pit and just north of the northernmost resident who has raised historical concerns regarding mining operations and dust. This location is very well suited to measure concentrations from the strong southerly and southwesterly components shown in the Lawrenceville wind rose.

An upwind site (#3) is located on property controlled by PMM that sits approximately 4.0 miles west/northwest of the active pit. This site is well exposed to characterize background concentrations upwind of the PMM property. It also offers an excellent location for the requisite, 10-meter meteorological tower.

U.S. EPA Region V staff approved the locations of the monitoring sites in a conference call with PMM on April 23, 2012.

Installation of the sites will be completed upon receipt of equipment from all vendors and EPA approval of the QAPP. While EPA is reviewing the QAPP, PMM will work on obtaining permits, if needed, for the monitoring sites and arranging for installation of 110 VAC line power at each location. This process is expected to take anywhere from 4 to 8 weeks. Once all approvals are obtained and each site has power, the installation activities will commence. Installation of the monitoring sites and training of the site

operator(s) is expected to take up to two weeks.

3.0 Quality Assurance Project Plan (QAPP)

The Quality Assurance Project Plan (QAPP) will be developed once monitoring sites and specific equipment models are selected. The QAPP will be submitted to EPA by June 1, 2012.

The QAPP will be formatted as per "Guidance for Quality Assurance Project Plans, EPA QA/G5", EPA/240/R-02/009, December 2002. The QAPP for the ambient PM_{10} and meteorological monitoring program will have four element groups: project management, data generation and acquisition, assessment and oversight, and data validation and usability.

The elements in the project management element group will consist of:

- Title and Approval Sheet: This element identifies key project officials and documents their approval of the QA Project Plan.
- Table of Contents: This element allows the reader to locate the different information sections.
- Distribution List: This element identifies all individuals who should get a copy of the approved QAPP.
- Project Organization: This element facilitates identifying the roles and responsibilities of those individuals involved in the project and their different organizations
- Project Definition and Background: This element describes why the project will be done and what needs to be done.
- Project/Task Description: This element describes the approach taken to address the project's objectives.
- Quality Objectives and Criteria for Measurement Data: This element describes quality specifications for the measurements used in the study.
- Special Training Requirements and Certifications: This element identifies any specialized training needed by project personnel working on the monitoring program.
- Documents and Records: This element includes information concerning the management of project documents and records.

The elements in the data generation and acquisition element group will consist of:

- Sampling Process: This element describes how the project's data collection will occur.
- Sampling and Reference Methods**:** This element details how samples or information will be collected consistently between locations and by all sampling personnel.
- Sample Handling and Custody: This element describes sample labeling, collection, and transportation.
- Analytical Methods: This element identifies the procedures to analyze samples.
- Quality Control: This section details the overall system of technical activities that measure the attributes and performance of the monitoring program.
- Instrument/Equipment Testing, Inspection, and Maintenance**:** This element describes how project personnel will know that the equipment is working properly.
- Instrument/Equipment Calibration and Frequency**:** This element identifies how the project will ensure continual quality performance of the monitoring instruments.
- Inspection/Acceptance of Supplies and Consumables: This element lists the critical field and laboratory supplies and consumables needed.
- Non-direct Measurements: This element addresses any data obtained from sources external to the project.
- Data Management: This element gives an overview of the management of the data generated throughout the project.

The elements in the assessment and oversight element group will consist of:

- Assessments and Response Actions: This element describes the evaluation process used during the project to ensure that the QA Project Plan is being implemented as approved.
- Reports to Management: This element lists the frequency, content, and distribution of project reports.

The elements in the data validation and usability element group will consist of:

- Data Review, Verification, and Validation: This element lists the criteria used to accept, reject, or qualify project data.
- Verification and Validation Methods**:** This element identifies process for verifying and validating project data.
- Reconciliation with User Requirements: This element discusses the final assessment of the data quality based on quality process used during the project.

Instrument Calibrations

Federal and state monitoring guidelines for quality control (QC) require that ambient particulate samplers and meteorological sensors be calibrated at certain times. Initial calibrations will be conducted immediately upon commencement of the project and at the mid-point of the 4-month monitoring program. After each set of calibrations is completed, a letter summarizing the results will be prepared and submitted to EPA within 21 days.

Quality Assurance/Performance Audits

Federal and state monitoring guidelines for quality assurance (QA) require that performance audits for particulate samplers and meteorological sensors be conducted at certain times during the monitoring program. A startup performance audit will be conducted within 15 days of monitoring start up, at the mid-point of the 4-month monitoring program and within 15 days of monitoring shutdown. Subsequent to each trip, a performance audit report will be prepared and submitted to EPA within 21 days of the completion of the audit.

Per federal requirements, performance audits will be completed by a different individual than the one who calibrates the instrumentation and using different test equipment than used to calibrate the monitoring instrumentation.

Certification of Calibration Standards; Certification Records

Test instrumentation used to calibrate and audit the particulate samplers and meteorological sensors will be certified yearly using standards traceable to the National Institute of Standards & Technology (NIST), where possible. Originals of the certification documents will be kept in the office files of PMM's air monitoring contractor. Copies will be included in the performance audit reports and calibration results letters.

4.0 PM_{10} Sample Collection

Once installed, the ambient particulate samplers will collect PM_{10} samples on a one-hour integrated basis. The samplers will measure and record airborne concentrations in micrograms per cubic meter using the principle of beta ray attenuation. The samplers are designed to perform hourly automated span checks to verify proper operation. Concentration data will be stored in the sampler's internal digital memory.

The collocated FRM ambient particulate sampler will collect PM_{10} samples on a 24-hour integrated basis from midnight to midnight local standard time every sixth day on the U.S. EPA national ambient particulate monitoring schedule. Filters will be archived for two years for potential future analysis.

Quality assurance procedures for the PM_{10} monitoring program will be in accordance with 40 CFR Part 58.

5.0 Reporting

PMM will provide monthly, letter-type data reports electronically to EPA by the 21st day after the end of the monthly monitoring period.-. Data will be supplied in MS Excel format. Sample filters for the FRM will be shipped to a qualified laboratory on a two week basis. Quality assured concentration data will be expected from the laboratory within 14 days of receipt of samples from PMM.

Calibration and audit reports will also be submitted to EPA within 21 days of their conduct.

6.0 Schedule of Deliverables

Following is a summary of key milestones for the project:

Selection of monitoring sites	Completed
Approval of Monitoring Sites	April 23, 2012
Submittal of QAPP to EPA	June 1, 2012
Initiation of monitoring	June 15, 2012
Monthly data reports submitted to EPA	By 21st day after end of monthly monitoring period
Performance audit reports	Within 21 days of conduct
Calibration results	Within 21 days of conduct

Figure 1

Table 1: Proposed Monitoring Instrumentation

Measured Parameter	Manufacturer	Model	EPA Designated FRM or FEM
PM_{10} FEM	Met One Instruments	BAM - 1020	EQPM-0798-122
PM_{10} FRM	Tisch Environmental	TE-6070V	RFPS-0202-14
Wind Speed	RM Young	05305	NA
Wind Direction	RM Young	05305	NA
Ambient Temperature	RM Young	41342VC	NA
Rainfall	RM Young	55203	NA
Barometric Pressure	RM Young	61302	NA
Data Acquisition System	Campbell Scientific	CR1000	NA

Appendix A

Specifications of Proposed Monitoring Instrumentation

Appendix B

Annual and Seasonal Wind Roses for Lawrenceville, Illinois